Zero Retries issue 0109 2023-07-28

Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

In this issue:

- **Request To Send**
- **Interesting Letter to FCC from Texas Department of Public Safety**
- **LimeSDR XTRX - Another Tiny SD Transceiver Board**
- **ZR > BEACON**
  - **No Agreement Yet for Amateur Radio to Continue to Use 1240 - 1300 MHz**
  - **APRS to SMS gateway down... or is it? (Apparently, back online)**
  - **Appalachian Trail Golden Packet 2023 *was* 2023-07-15**
  - **QSO Today Virtual Ham Expo is now QSO Today Academy**
  - **TETRA Encryption (Easily? Inexpensively?) Broken**
  - **Amateur Radio TCP/IP Tunneling over Starlink**
- **Updata**
  - **Still no Part 2 or Part 3 of Crucible of Communications Series**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0109

Request To Send

Editorial by Steve Stroh N8GNJ

Again, apologies for my accidental transmission of the Zero Retries Template.

'Nuff said.

Another Box for DLARC

Those who live in the Northwestern corner of North America know all too well how fleeting Summer weather is here. Thus it felt a bit foolish to spend a Summer day inside like I did this past rare weekend that was not otherwise committed to family business. Fortunately, "inside" for me is more pleasant than usual because my office is a partitioned corner of N8GNJ Labs and I can open both the office door and the bay door and let some sunshine and fresh air flood in.

The work I was doing "inside" was more important than the temptation to "play radio". That would definitely be fun, but doing so mostly has personal relevance, and can be done at some point in the future (though I've now accumulated three new-to-me radios that haven't yet made it out of the box). Instead, I decided to use this rare-of-late office time for what I consider a more important task that has relevance for Amateur Radio as a whole - packaging more of my Amateur Radio literature collection for shipment to the Digital Library of Amateur Radio & Communication (DLARC). I just completed my 20th box, with a total of 1483 separate items which have now been shipped to the Internet Archive for digitizing and sharing.

I write often about DLARC in Zero Retries, most recently in Zero Retries 0107 as one of the The Ten Most Zero Retries Interesting Projects - Summer 2023. It's a measure of just how much trust DLARC has developed that in the next batch, I will be sending1 some of my most rare Amateur Radio media - my collection of Packet Radio Magazine (PRM).

Vol. 1 No. 1
January 1986

PACKET RADIO MAGA

Dedicated to the Advancement of Pack

PACKET ON THE

FADCA Inc.
812 Childers Loop
Brandon, FL 33511

STEVEN K. STROH

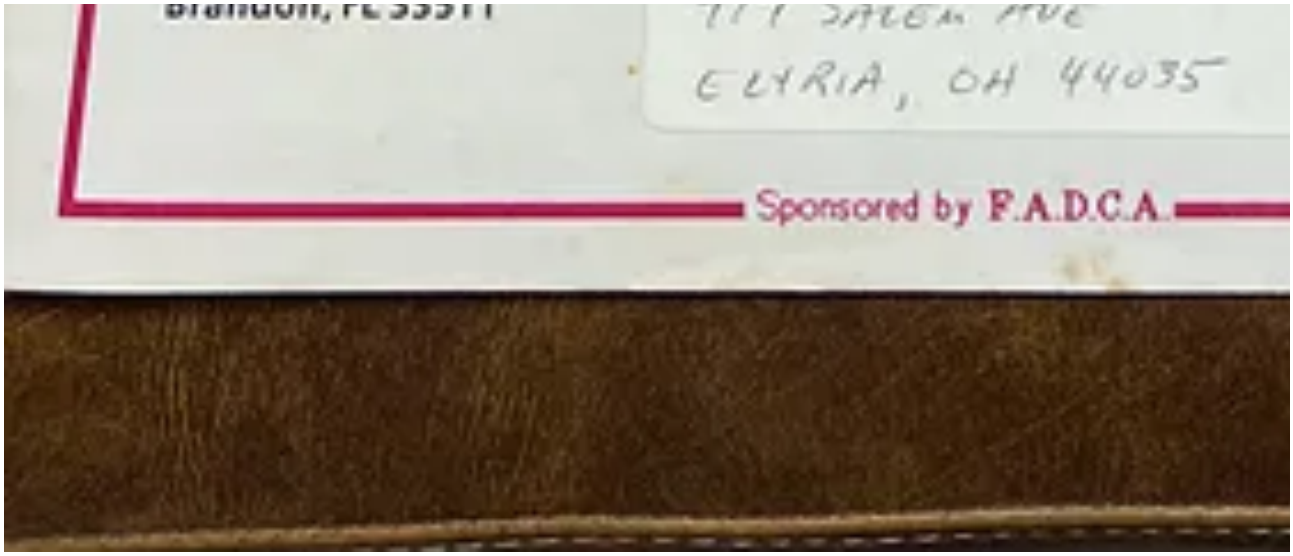


Image from Steve Stroh N8GNJ - personal collection

I *think* the hand-lettered label is from Gwyn Reedy W1BEL (Silent Keyboard), Editor of PRM.

PRM had the most poignancy for me of all the Packet Radio newsletters because it was monthly and within its covers, it provided a look at Packet Radio from many of the most influential Amateur Radio organizations involved in Packet Radio - *monthly*. For comparison, TAPR's Packet Status Register was quarterly, and ARRL's Gateway newsletter was bimonthly, but limited to four pages.

I'd been hesitant to send my Packet Radio Magazine collection to DLARC because years ago I sent some material to Internet Archive2 that, last I checked, has not been digitized and made available. But because DLARC was funded by an ARDC grant, all of the material I have contributed *has* shown up in the DLARC collection, which is tremendously gratifying.

As I've explained before, the temptation is strong to hold to precious media (from what was, to me, *a magical era)* like my Packet Radio Magazine collection and "scan them myself" and share out my scans. But, I've embraced the "know thyself" mantra and my reality is that it's unlikely that "I'll get around tuit" and get that scanning *done*. Even if I did, the quality of *my* scanning cannot compare to the archival-quality job that Internet Archive does. In the end I'll trust Internet Archive to do a good job and look forward to viewing their excellent scans and enjoy the knowledge that no one else had this material (or, at least, had it and was willing to let it go for posterity), and now everyone has access to it.

Another Big Project Underway

I spent a couple of days this week working on what turned out to be a too-ambitious project. The specifics of the project aren't quite ready to be revealed, but it involved "ingesting" a significant portion of Zero Retries content, and what ultimately stopped my progress was *just how much content I'm generating here* in Zero Retries. While creating the Zero Retries Newsletter every week is doable on a laptop (as I'm now doing) the "big project" proved impossible to tackle on a laptop's limited display. To make reasonable progress on the big project, I really need the much larger display I have in my office. Thus the big project is going to have to wait until I have more time in my office… perhaps after life settles down a bit ~~in late September~~.

Three, *Perhaps Four* Weeks At Home

Within hours of writing "in late September" above, I received word that my wife's and my extended travel will end early, and thus my wife and I will be able to spend at least three, perhaps four, weeks at home in beautiful Bellingham Washington. Being home for a week at a stretch has been a rare luxury for us in 2023. Thus with *this* extended stretch of "home time", it might be able to work on the big project above, but also finish my packaging of donations to DLARC, putting those three new-to-me still-in-the-box radios to use… the mind reels with the possibilities!

Interesting Letter to FCC from Texas Department of Public Safety

By Steve Stroh N8GNJ

Texas Department of Public Safety politely requests that the FCC update its Amateur Radio regulations to allow faster data communications via Amateur Radio.

In a video on his Ham Radio 2.0 YouTube Channel - Texas Wants FCC Rule Limiting Amateur Radio Dialed Back, Jason Johnston KC5HWB highlights a notable letter from Karla Jurrens, Statewide Interoperability Coordinator for the Texas Department of Public Safety to FCC Chairperson Jessica Rosenworcel.

> I am writing this letter to you to demonstrate my support of the effort to review the impact FCC rules have on digital communications, contained within Section 97.307(f)3 of the Federal Communications Commission (FCC) rules. These limiting rules prohibit the State of Texas amateur radio operators to efficiently transmit and receive messages during times of disaster. This negatively impacts our citizens both in and out of disaster impacted areas.
>
> As the Statewide Interoperability Coordinator for Texas, it is critical that our State Emergency Response Teams have timely, accurate, and adequate communication flow during disasters. The state of Texas relies on effective amateur radio communications to provide critical information and ground truth in areas severed from traditional modes of communications. Unfortunately, the Symbol Rate Limit rule restricts

> our ability to accomplish this vital task. By eliminating the Symbols Rate Limit rule, messages can be transmitted at almost twice the speed in the same occupied bandwidth.
>
> The FCC recognizes the problem and issues Special Temporary Authorization (STA) during emergencies; however, this process takes vital time that may not be available during emergencies. Eliminating the Symbol Rate Limit rule will eliminate this need and allow seamless information flow during training, planning, responding to, and recovering from disasters.
>
> I support the great state of Texas' amateur radio community and the review of speed limitations on digital communications on all appropriate auxiliary communications pathways.
>
> I appreciate your consideration in this matter and partnership of the FCC.

I offered my comments (lightly formatted for publication here):

> Kudos to Karla Jurrens of TDPS, because she gets it *right* in her letter, requesting that the FCC "[Eliminate] the Symbol Rate Limit rule...". Note that her request does not specifically mention Amateur Radio HF bands.
>
> The "symbol rate" issue is *much* bigger than the data rate limitations on HF. The antiquated symbol rate limitations in the US FCC Amateur Radio rules are now actively handicapping progress on Amateur Radio VHF and UHF data communications! On 219-220 MHz, and 222 MHz and above, a 100 kHz channel can be used, *but* the speed of data transmission is limited per 47 CFR § 97.307 (f) (6) - "The symbol rate must not exceed 56 kilobauds" on 219-220, 222-225, and 420-450 MHz.
>
> No big deal, right? 56 kbps would be pretty cool. Except, in this era with very powerful computers, wideband modems, cheap Digital Signal Processors, and especially Software Defined Radio transceivers, we can do a *lot* better.
>
> The most absurd example of how nuts 47 CFR § 97.307 (f) (6) is these days is to look at the disclaimer for a cool data radio called New Packet Radio that also uses a 100 kHz channel, on 420-450 MHz, and can do 500 kbps. But, because of 47 CFR § 97.307 (f) (6), they're forced to recommend the "dumbed down US mode". Per https://elekitsorparts.com/product/npr-70-modem-by-f4hdk-new-packet-radio-over-70cm-band-amateur-radio-packet-radio/:
>
> *Note for USA : Due to CFR 47 Part 97.3 FCC regulations, for the 70cm amateur radio band (restriction to 100kHz and 56kBaud), only the setting "modulation 20" of NPR-70 seems to be legal in USA. Please always check your local amateur-radio regulation before buying and using NPR70. Modulation 20: Symbol Rate 50kS/s, bandwidth 100kHz, raw datarate 100kb/s raw, usable datarate 65kb/s.*
>
> You're reading that right! To operate this radio legally in the US, per 47 CFR § 97.307 (f) (6), you have to dial the speed back. The radio *will* do 500 kbps. Using it in the "slow" US mode, it *still* uses the same 100 kHz channel... it just transmits data slower - about 10x slower. But if you're anywhere *but* the US, that same radio is legal to operate at 500 kbps.
>
> It's disappointing that the ARRL (who is ultimately behind this campaign - see https://www.zeroretries.org/i/90014902/us-legislation-proposed-to-force-fcc-to-replace-symbol-limit-on-hf-with-khz-bandwidth-limit) remains focused on HF data communications and is apparently completely ignorant of how much progress is happening on VHF / UHF data communications.

Note that while Jurrens references 97.307(f)3:

> (3) Only a RTTY or data emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. The symbol rate must not exceed 300 bauds, or for frequency-shift keying, the frequency shift between mark and space must not exceed 1 kHz.

… she refers to this as

> Symbol Rate Limit rule

The YouTube comments were the usual mixed bag - a few relevant and interesting comments, with the vast majority… forgettable. There were no followup comments to my comments, nor any "Thumbs Up" (or down).

I don't know what it might take to "retarget" this apparently very active campaign from
specifically addressing symbol rate limitations in 97.307 (f) (3)
to
removing all of the symbol rate / baud limitations in 97.307.

What's lost in all of this discussion is that radio technology has radically transformed in the past two decades. The symbol rate / baud limitations imposed in 97.307 were written largely to insure that "over modulating" at higher speeds than specified wouldn't cause the radios of the era to occupy a wider channel than specified. But current generation radios, largely software-defined, can now "tailor" the waveform to scrupulously observe the bandwidth limits, while still taking full advantage of new modulation techniques for faster data communications rates.

Note: I stated ***can*** now "tailor"… We're still a long way from all, or most Amateur Radio equipment currently in use in the US being so capable, especially when it comes to very inexpensive equipment sold with no real certification for US Amateur Radio use. It may be that the FCC can make a strong argument for leaving these arcane rules in place because, provably, US Amateur Radio Operators have widely embraced the use of new radios that are not compliant with FCC Part 97 rules.

But, the proof case of New Packet Radio makes a strong case, in this era, that US Amateur Radio is now actively being handicapped by the arcane symbol / baud rate limitations in 97.307.

Perhaps another example will make a bit more impact. In ~2004, Icom released the ID-1 radio with the notable feature of "Digital Data" mode (DD mode) - 128 kbps data rate. The ID-1 operated on 1240-1300 MHz, and used a 100 kHz channel. Fast forward a couple of decades, and DD mode (128 kbps, 100 kHz channel, usable only on 1240-1300 MHz) has now been implemented in the Icom IC-9700 and the Icom IC-905. Both of those new radios include the 420-450 MHz band. Note that 100 kHz channels are available in 420-450 MHz. It's my speculation3 that Icom could have implemented DD mode on 420-450 MHz, if not for the limitation in 97.307 (f) (6)- *The symbol rate must not exceed 56 kilobauds.*

Imagine the capability of a 128 kbps data mode, with the vastly improved range of 420-450 MHz (versus 1240-1300 MHz) coupled with transmit power of 75 watts (in the IC-9700)… What kind of a difference would *that capability* make in Amateur Radio?

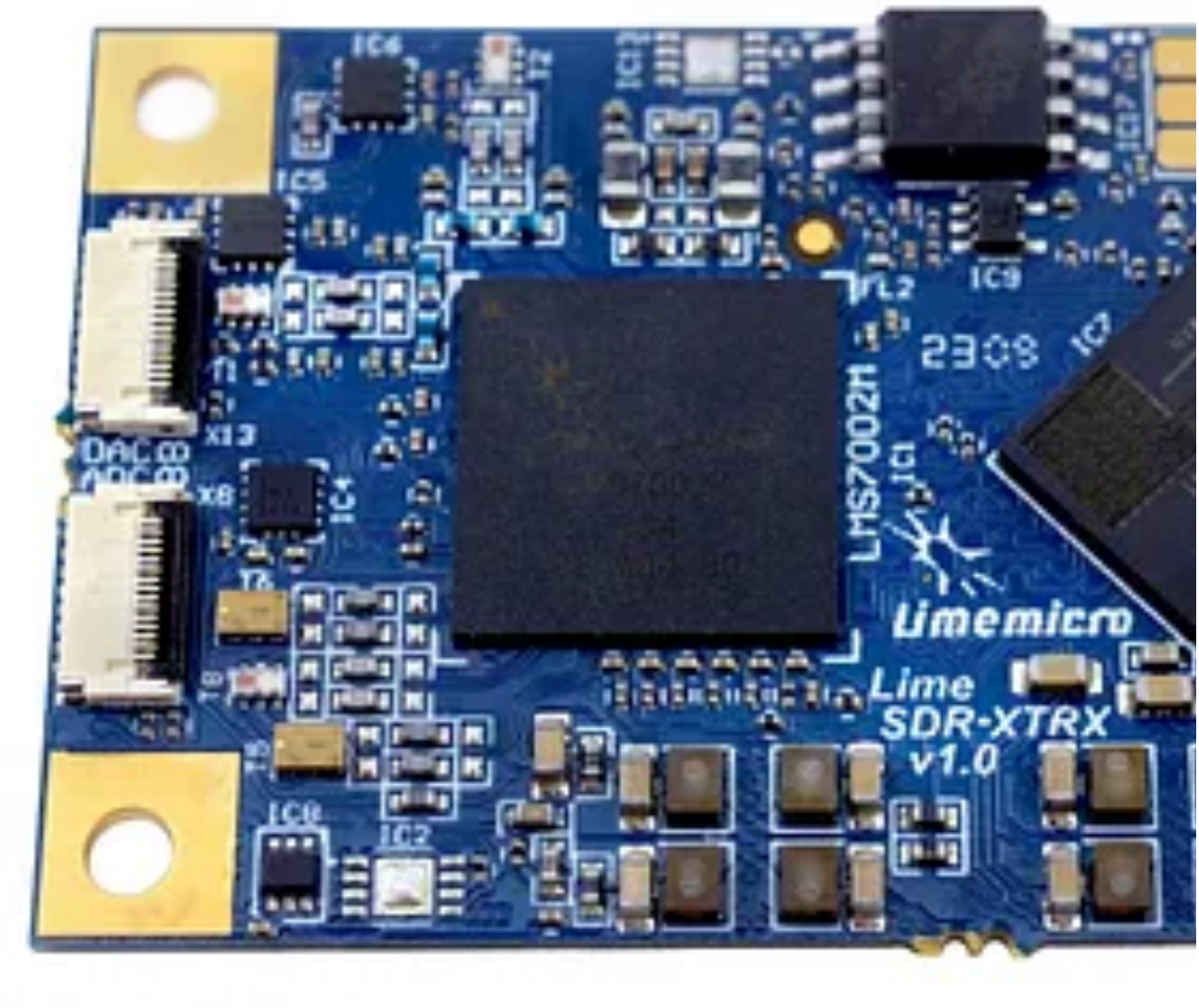
Leave a comment

Share

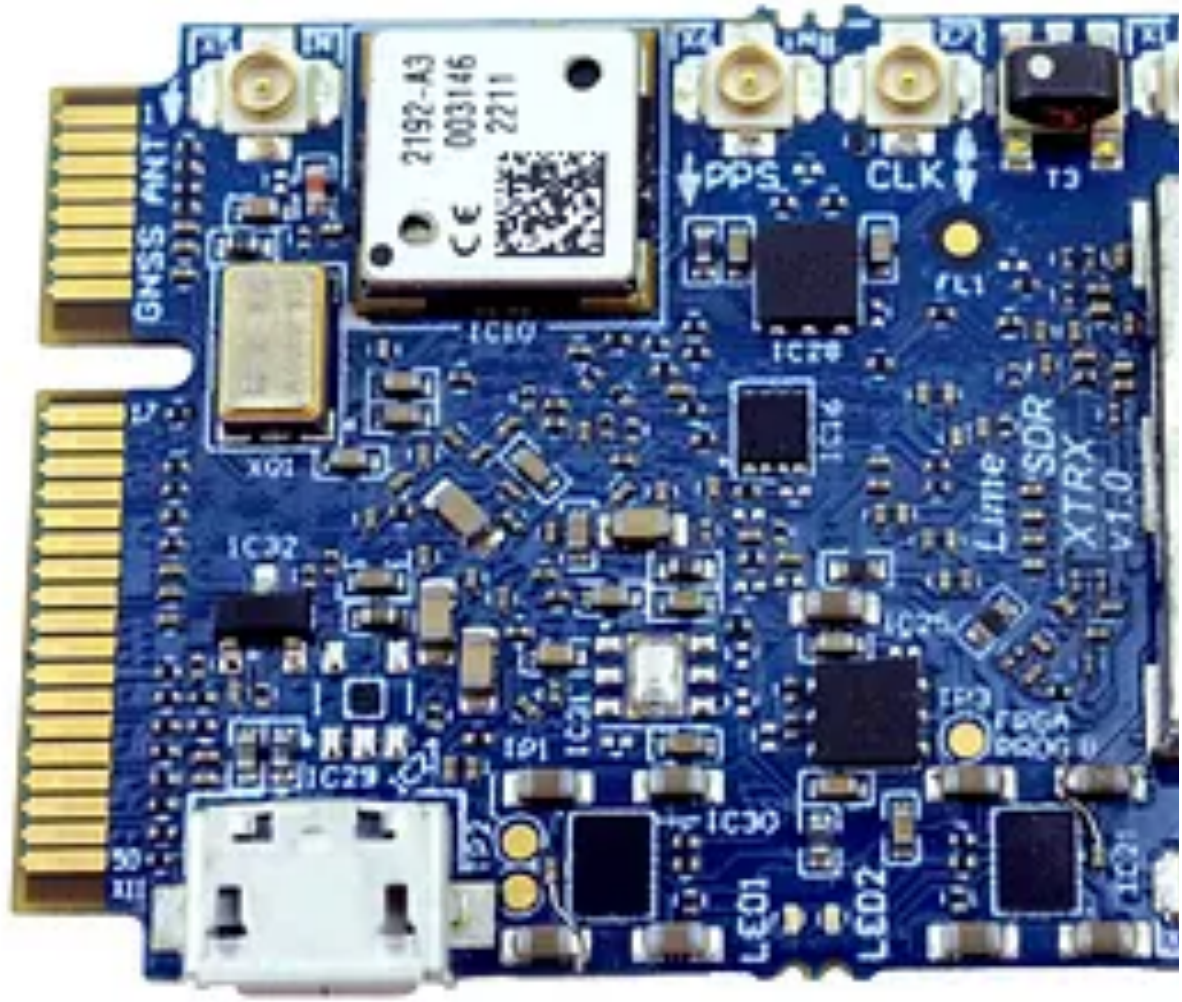
LimeSDR XTRX - Another Tiny SD Transceiver Board

By Steve Stroh N8GNJ

A new, embeddable, high-performance Software Defined Transceiver in a Mini PCIe form factor from Lime Microsystems, crowdfunded via Crowd Supply.



Bottom View - Image courtesy of Lime Microsystms / Crowd Supply



Top View - Image courtesy of Lime Microsystems / Crowd Supply

If you aren't familiar with Mini PCIe form factor, it's *tiny*! As in 30 x 50.95 mm - approx. 1 inch by 2 inches. Imagine how easily (at least mechanically) this could be integrated into a new system. All design files and documentation of the LimeSDR XTRX are available as open source in a Github repository.

For the logic work, it includes an Field Programmable Gate Array (FPGA). It's capable of operating between 30 MHz and 3.8 GHz, with a bandwidth over 100 MHz. It also includes a GNSS receiver. What really recommends this system, besides its diminutive size, is that it's an evolution of previous Lime Microsystems products, and likely this one will be just as capable, with good software compatibility (including GNU Radio) with other Lime Microsystems products.

The usual disclaimer applies - at present, this is a project, not a product, and if you "buy" one now, you're assuming the risk that it may not become a product. The cost of the LimeSDR XTRX is projected to be ~$700.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

No Agreement Yet for Amateur Radio to Continue to Use 1240 - 1300 MHz

Report from the International Amateur Radio Union (IARU):

> ITU-R Working Party 4C meeting #30 could not agree on the technical and operational measures required to ensure the protection of the RNSS (radio navigation satellite service) in the amateur 23cm band.

RNSS is Radio Navigation Satellite Service, and worldwide it is the “incumbent” in the 1240-1300 MHz Amateur Radio band. The context is that there are now a number of RNSS systems operational, and growing, including systems from Russia, China, and Europe. Amateur Radio needs to develop a a satisfactory “sharing” agreement with RNSS system operators as part of the upcoming World Radio Communications Conference 2023, or it’s conceivable that Amateur Radio will no longer have access to all, some, or any of the 1240-1300 MHz band.

APRS to SMS gateway down... or is it? (Apparently, back online)

A 5:22 video on YouTube channel KM6LYW Radio mentioned this development.

SMSGTE’s tagline is *Bridging the gap between APRS and SMS*.

I checked the website and found:

SMSGTE Service is Offline

> This gateway, known as SMSGTE (pronounced sms geit) was launched in 2014 as a means of reaching loved ones when out in areas uncovered by cellular services. Since then, the gateway has grown to serve 6000 users, with over 1000 users added in 2020. It’s a free service that is currently self-sustaining through donations from the users. By today’s standards, this is a small community of users, but I’m quite proud that it provides piece of mind to those who venture into remote areas.
>
> The SMSGTE service [is] currently offline. New regulations put into place in the US, Canada and other jurisdictions along with some recent abuse of the service to send SPAM have forced me to shut the service down. I am currently searching for a solution to restore service. If there is a club or HAM organization interested in assisting, one that is a legally registered business or non-profit, please contact me.

But a comment in the YouTube video seems more current than the service’s website:

> JeremiahBess [2023-07-24?]
>
> SMSGTE is not down any more. The owner/admin, Paul Dufresne, had issues back in May and changed his website to reflect that. I had some correspondence with him on 20 May and he said he figured things out and brought the system back online. I just successfully sent myself a text message through SMSGTE, no issues. Seems like he hasn't changed his website to reflect that though, I suspect he's still wanting some help

SMSGTE is a useful service, and is one of those many interesting services that individual Amateur Radio Operators see a use for and implement, but it’s a struggle to keep going purely as a passion project.

Appalachian Trail Golden Packet 2023 *was* 2023-07-15

> Every year for the past 11 years, licensed amateur radio operators coordinate 15+ sites along the length of the Appalachian Trail from Maine to Georgia. We use transceivers to exchange packet data between each site with the goal of sending the "golden packet" the entire length of the trail!
>
> Robert Bruninga (WB4APR - Silent Key), the creator of the APRS protocol, founded the Appalachian Trail Golden Packet event. The intent is to get licensed amateur radio operators ("hams") to feel more comfortable with operating in the field, while demonstrating the ability to send real-time messages along 2200+ miles without the need for any infrastructure!

I missed mentioning ATGP 2023 in advance in Zero Retries - apologies!

The page for ATGP 2023 has some interesting information:

> **Phase 2: ATGP Next-Gen**
>
> The second phase of the AT Golden Packet is arguably the more exciting of the two! This is where hams can use a Raspberry Pi, with a high-quality audio interface, and a radio that provides access to the discriminator. If your radio has a data interface - then it likely has a discriminator).
>
> ATGP certified the APRS Appliance (by Don AB1PH). The APRS Appliance was deployed at several of the ATGP sites during ATGP 2022 and was wildly successful! In fact, we determined that with the right hardware and Direwolf (a software-based TNC), that it is possible to get better results than purpose built hardware - like the aforementioned Kenwood radios!

The high-quality audio interface referenced is DINAH from Kits For Hams. The superiority of Direwolf for decoding of 1200 bps Audio Frequency Shift Keying (AFSK) signals is now well-documented.

QSO Today Virtual Ham Expo is now QSO Today Academy

The Call for Speakers for the new QSO Today Academy online event (2023-09-09 and 10) closes 2023-08-01. Some of the topics that are being solicited are Zero Retries Interesting:

- Satellite and space communications
- EME - Moon Bounce
- VHF, UHF, and Microwave
- Digital Modes

- Software Defined Radio

One subtle change from the Virtual Ham Expo to Academy was that with the former, there was an explicit commitment that after a period of time of exclusive access for paid attendees, the presentations would be made publicly available. In explaining the new QSO Today Academy, I don't see the same commitment to the presentations becoming publicly accessible after a period of time. I hope that's merely an oversight, and not a permanent paywall for presentations made as part of the Academy.

TETRA Encryption (Easily? Inexpensively?) Broken

From RTL-SDR.com: Encryption on the TETRA Protocol has been Broken:

> TETRA (Terrestrial Trunked Radio) is a digital voice and text radio communications protocol often used by authorities and industry in European and many countries other than the USA. A major advantage to a digital communications protocol like TETRA is it's ability to be secured via encryption.
>
> Recently the security researchers at Midnight Blue in the Netherlands have discovered a collection of five vulnerabilities collectively called "TETRA:BURST" and most of the five vulnerabilities apply to almost every TETRA network in the world. These two most critical vulnerabilities allow TETRA to be easily decrypted or attacked by consumer hardware.

An article in Vice - *Researchers Find 'Backdoor' in Encrypted Police and Military Radios*4 included a bit more detail, such as:

> The end result, however, are radios with traffic that can be decrypted using consumer hardware like an ordinary laptop in under a minute.
> …
> An attacker who followed this step would then be able to decrypt intercepted traffic with consumer-level hardware and a cheap software defined radio dongle.

I'm *shocked*, ***Shocked*** 😉 that technologies readily available to consumers such as computers and Software Defined Receivers have become so powerful (and so ubiquitous) to enable passive monitoring of encrypted radio transmissions. I stand by my statement in Zero Retries 0106:

> Thus, although these companies are undoubtedly being assured that their communications will be private through the use of encryption and proprietary techniques, I suspect it won't be long before such communications are rendered "not quite so private".

But seriously… what Zero Retries reader is surprised by this development? I would have thought that the "security through obscurity" (proprietary techniques, not publicly revealed… or vetted are assumed to be secure) has been thoroughly debunked by now? And, as Bob McGwier N4HY has said (in this video, I think…, *paraphrased*):

> … if you think *that's* impressive, you haven't seen anything yet. Wait until you see Artificial Intelligence / Machine Learning applied to radio communications.

And that was years ago now - a generation ago of processors, Digital Signal Processors, Software Defined Radios, and most of all, Large Language Models for Artificial Intelligence that have been released as Open Source, that can be run on those inexpensive platforms:

SAL, analyze the transmission I just clicked on and decrypt it.

We really, really, really need more folks with hands-on experience with radio technology in the computing security field. And, we need them ~~*now*~~ *yesterday*.

Amateur Radio TCP/IP Tunneling over Starlink

Josh Proehl AI7JP did a great writeup - Ham Radio over Starlink - Radio waves via IP via Satellite! on how he helped the WA7VC Ham Radio Club use Starlink for D-Star, Echolink / ILRP, remote operation of a FlexRadio unit, and an APRS node.

At the TAPR Digital Communications Conference 2022, Tom McDermott N5EG did a presentation - Starlink, AREDN, and Networking (YouTube) about linking AREDN networks via Starlink.

Both AI7JP and N5EG describe the difficulties of using Starlink for Amateur Radio applications that use TCP/IP because Starlink uses Carrier Grade Network Address Translation (CGNAT) to deal with a scarcity of IPv4 addresses. CGNAT aggressively "reclaims" both IP addresses and IP sockets. Thus any sustained communications link must be "outbound" from the Starlink terminal to a server on the Internet (not another Starlink terminal or any other system that uses CGNAT).

Perhaps in the future, 44Net will provide such a service.

Updata

By Steve Stroh N8GNJ

Short updates from previous issues.

Still no Part 2 or Part 3 of Crucible of Communications Series

In Zero Retries 0102, I mentioned an interesting article:

> Crucible of Communications: How amateur radio launched the information age and brought high tech to life

Part 1: The birth and breadth of the ham radio hobby

Part 1 was published 2022-10 and I've periodically checked to see if the promised Part 2 and Part 3 have been published, and to date, I cannot find *any* reference to Part 2 or Part 3. Part of the issue is that the IEEE Communications Magazine (where the article first appeared) has a remarkably bad user interface, and I could not do any effective searches on the content of that publication. Not to mention I'm not a member of IEEE nor am I a subscriber to Communications Magazine. Even the mighty Google cannot find any reference to Part 2 or Part 3.

If anyone knows anything about this series, please drop me a note.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- **Founding Members who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Chris Osburn KD7DVD
  Founding Member 0002 - Don Rotolo N2IRZ
- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org
- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- TAPR Packet Status Register has been published continuously since 1982.
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ~~100~~ ~~200~~ ~~300~~ ~~400~~ *500* ~~600~~ ~~700~~ *800+* other readers:

Subscribe now

Please tell your co-conspirators about Zero Retries — just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy — just click:

Leave a comment

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-07-28

If you'd like to reuse an article in this issue, for example for club or other newsletters, just ask. Please provide credit for the content to me and any other authors.

All excerpts from other authors or organizations, including images, are intended to be fair use.

Portions Copyright © 2021, 2022, and 2023 by Steven K. Stroh.

Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

1

The Packet Radio Magazines are in a box that's being filled, to be completed in the next few weeks.

2

In fairness to Internet Archive, that donation was unsolicited / uncoordinated (I *tried*, but could not get any acknowledgement to my emails).

3

The potential to operate DD mode on 420-450 MHz in the IC-9700 and IC-905 is *purely my* ***speculation*** - I did not reach out to Icom to ask this question… nor would I expect them to confirm or deny my speculation.

4

The Vice website obnoxiously breaks web conventions, and froze my browser, so I won't link to it.